

## **COYOTE**

Jackson (1961) felt that coyotes were likely present in southern Wisconsin at the time of European settlement but it was uncertain how far north they extended due to confusion between coyotes (“brush wolves” or “prairie wolves”) and wolves in early records. By 1960, Jackson indicated that coyotes were more abundant in northern Wisconsin than in the southern part of the state. Long (2008) stated that coyotes were distributed throughout the state.

Heavily exploited coyote populations typically have a younger age structure, lower survival, increased yearling fecundity, and smaller packs than unexploited populations (review by Bekoff and Gese 2003).

Currently, coyotes can be hunted and trapped throughout Wisconsin with no bag limits. The open seasons for coyote hunting is year-round and for trapping is from mid-October through mid-February. Although the agency does not regularly make decisions regarding changes in coyote harvest management, WDNR (1995) stated that estimates of harvest and an index of relative abundance are needed for all harvested species.

### **Current monitoring program**

Estimates of statewide coyote harvest by small game hunters are made from the Small Game Hunter Questionnaire and by trappers from the Fur Trapper Questionnaire. These surveys also provide estimates of the number of hunters and trappers and effort expended in pursuing coyotes. Annual estimates of the number of coyote pelts purchased by Wisconsin fur buyers are obtained from the Fur Buyer Report.

A regional index of abundance is derived from the Summer Wildlife Inquiry. The Winter Track Survey provides an index of coyote abundance in northern Wisconsin; Henke and Knowlton (1995) suggest that standardized track counts may be the most reliable measure of relative abundance of coyotes. The Annual Mammal Survey collates reports of coyote sightings (live and vehicle-killed) by WDNR personnel and the Deer Hunter Wildlife Survey records coyote observations by deer hunters. The Bobcat Hunter/Trapper Survey asked bobcat harvesters their opinion of changes in coyote populations in northern Wisconsin. Observations of coyote tracks are recorded as part of the Volunteer Carnivore Tracking project; however, reports of coyote track observations by project volunteers are not summarized on a routine schedule.

## **Challenges**

Coyote harvest estimates are obtained from the Small Game Harvest Survey and the Fur Trapper Survey. Response rates to both surveys are low, approximately 29% in 2011, and no effort is made to correct for non-response bias. Filion (1980) noted that many sociological surveys have found that nonrespondents differ significantly from respondents in demographic and socioeconomic characteristics and that nonrespondents tend to be less active hunting participants with less previous experience. Filion (1980) referenced several studies that observed overestimates of harvest from hunting surveys for a variety of species due to nonresponse. Due to the low response rate to the Small Game Harvest and Fur Trapper surveys our estimates of coyote harvest are likely biased high. In 2011, the Small Game Harvest Survey produced a harvest estimate of 60,341 coyotes and the Fur Trapper Survey yielded an estimated harvest of 12,713 for a combined harvest of 73,054. This compares to 7,628 coyote pelts purchased from fur

harvesters in 2011 based on reports from licensed fur buyers. Respondents to the fur trapper survey report selling the majority of coyote pelts (63%) to in-state furbuyers.

The Small Game Harvest Survey provides estimate of precision for harvest estimates. In 2011 the 95% confidence interval for the coyote harvest was  $\pm 23,306$ , which was 39% of the estimated harvest. Due to the relatively low precision of coyote harvest estimates, annual variation in estimates should be interpreted with caution. No estimate of precision is provided for harvest estimated from the Fur Trapper Survey.

In 2011 the Summer Wildlife Inquiry was mailed to a sample of 5,277 rural residents and responses were received from 1,311 landowners, for a response rate of 25%. Data are summarized by the 5 DNR administrative regions resulting in sample sizes of 170-340 landowners per region. The precision of trend estimates of coyote sightings has not been assessed. Reported coyote sightings in most regions have increased substantially during the past 20 years with 60-70 percent of rural landowners reporting coyote sightings in 2011, except in the Northeast region (~40%). As the proportion of landowners observing a coyote approaches 100%, the relationship between the index and actual population change will be non-linear due to saturation (MacFarland and Van Deelen 2011).

The relationships of coyote population trends from the Summer Wildlife Inquiry, Annual Mammal Survey, and Winter Track Counts have not been assessed. Also data on coyotes detected by the Volunteer Carnivore Tracking project have not been reported.

### **Alternative Surveys**

Henke and Knowlton (1995) reviewed techniques that had been used to estimate coyote population density and indices to relative abundance; potential indices they

reviewed included catch-per-effort, scent-station surveys, scat surveys, track surveys, and elicited howling surveys. Catch-per-effort indices require standardization in use of equipment by different individuals and may be affected by unequal probability of capture among different components of the population. If questionnaires of harvesters are used to assess harvest and effort, honesty of respondents may affect the accuracy of results. Successful harvesters may be more likely to report that they actively hunted or trapped for coyotes.

Scent station surveys have been widely used, especially in western states (Henke and Knowlton 1995). Visitation rates to scent stations may be affected by individual behavior of coyotes; i.e., familiarity with the area, previously been trapped, and habituation to specific scents. Visitation rates may also be affected by environmental factors such as precipitation, strong winds, and vehicle traffic.

Scat surveys involve clearing a specified length of unimproved road of coyote scats and then walking the segment of road again after a specified number of days recording the number of scats deposited per unit of distance per day. Potential biases include effect of vehicle traffic on coyote road use and persistence of scat and observers failing to detect scats that were present, especially on transects with relatively few scats.

Howling surveys have used sirens, recordings of coyote howls, human imitations of howls, or other stimuli to elicit coyotes to respond (review by Henke and Knowlton 1995). Typically surveys are driven between dusk and dawn, with stops spaced at least 2.5 miles apart. The number of stops with responses or the number of responding groups per station is used as an index of abundance. Response rates may be influenced by type of stimuli, time of night, season, or social status of animals (transients may be less likely

91 to respond). Additionally environmental factors such as topography, vegetation density,  
92 wind speed, temperature, and auditory acuity of observers can affect the distance over  
93 which coyote howls can be heard. A study in the Great Smoky Mountain National Park  
94 found that howl surveys were substantially more efficient than scent station surveys in  
95 detecting coyotes (Crawford et al. 1993).

96 Minnesota has been using scent station surveys to monitor terrestrial furbearers  
97 since the mid-1970s (Erb 2011). Currently, routes are 4.3 km long, with 10 stations per  
98 route. Tracking stations consist of a 0.9 m diameter circle of sifted soil with a fatty-acid  
99 scent tab placed in the center. Routes are checked one day following establishment for  
100 presence/absence of tracks. Most routes are situated along unpaved secondary roads or  
101 trails. In 2011, 283 routes were completed during September and October resulting in  
102 2,671 station-nights, with a route density of  $1/766 \text{ km}^2$ . Surveys have been conducted by  
103 professional staff of the MDNR wildlife division, U.S. Forest Service, U.S. Fish and  
104 Wildlife Service, National Park Service, tribal natural resource departments, county land  
105 departments, community colleges, and high schools. During the 36 years that scent-  
106 station surveys have been conducted the number of station-nights has averaged  
107 approximately 3,000. Sargeant et al. (1998) evaluated the statistical properties of  
108 Minnesota's scent station surveys, concluding that while the statistical power to detect  
109 trends in carnivore populations was low, the observed long-term trends in visitation rates  
110 probably reflected real changes in populations. Currently Minnesota summarizes the  
111 survey results for 3 biogeographic regions (forest, transition, farmland).

112 Engeman et al. 2000 evaluated a passive activity index for use in monitoring  
113 changes in coyote abundance associated with a trap testing program. They established a

series of tracking plots with raked and smoothed soil along low-use dirt roads and checked plots daily for 2-4 consecutive days pre- and post-trapping. They felt that the passive index that did not use an attractant produced fewer methodology-induced changes to animal behavior/activity than scent-station surveys. However, the labor involved with creating passive plots and subsequent lower detection rate will likely limit the utility of a passive index regional or statewide coyote population monitoring.

Archer surveys (as described in the Bobcat Section) can also be used as an index of abundance for coyotes.

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